

STUDIES IN THE GENUS *BIDENS*. II

CONTRIBUTIONS FROM THE HULL BOTANICAL LABORATORY 201

E A R L E. S H E R F F

(WITH THREE FIGURES)

Bidens acuticaulis, sp. nov.—Herba annua, tenerrima, 4–8 dm. alta; caule acute angulato, ramoso; ramis adscendentibus, acute angulatis et fere subalata, remote pubescentibus. Folia opposita, petiolata, petiolo adjecto 1–4 cm. longa, pinnata aut irregulariter bipinnata; foliolis (et lobis) linearibus, 0.5–1 mm. latis. Petioli 2–10 mm. longi. Capitula multa, terminalia, 3–4 mm. alta et 2.5–3.5 mm. lata (frutescentia demum 1–1.2 cm. alta et 4–5 mm. lata), ligulata. Involucrum basi pubescens; squamis duplici serie dispositis; exterioribus linearibus, plus minusve pubescentibus, 3–4 mm. longis; interioribus lanceolatis, marginibus diaphanis 1.5–3 mm. longis. Ligulae circiter 4, parvae, sub-flavae aut fere albae, 2–(4–) striatae, 3–5 mm. longae. Paleae lineare-lanceolatae, striatae, marginibus diaphanis. Achaenia linearia, remotissime pubescentia, margine adscendente-ciliato, apice erecto-hispido et biaristato aristis retrorsum hamosis, 6–12 mm. longa.

John Gossweiler 4052, in herb-grown woods, Angola, April 4, 1906 (type in Herb. Brit. Mus.).

Bidens rufovenosa, sp. nov.—Herba erecta, perennis (?), 4–6 dm. alta; caule subtereto, striato, glabro, plus minusve ramoso; ramis (aut ramulis) monocephalicis. Folia opposita, petiolata, petiolo adjecto 4–6 cm. longa, pinnata, spinuloso-ciliata, supra sparsim et brevissime spinuloso-pubescentia, infra sparsim pubescentia et ad venas minute rufo-tomentosa;¹ foliolis lateralibus lanceolatis (aut foliorum superiorum lineare-lanceolatis), incisis aut longe dentatis; foliis supremis integris et lanceolatis, aut ternatis, foliolis integris et lanceolatis; petiolis basi connatis, foliorum

¹ Dr. S. ECKERSON, of the University of Chicago, has kindly made for me a critical examination of a leaf from the type, and she reports the color of the pubescence due to a red stain produced in the mucilage cells along the veins.

inferiorum angustis et 1-1.5 cm. longis, foliorum superiorum brevioribus aut absentibus. Capitula ligulata, frutescentia 1-1.3 cm. lata et 0.8-1 cm. alta. Involucri squamae membranaceae, margine diaphanae, duplici serie dispositae; exterioribus (7-8) linearibus, 3-5 mm. longis; interioribus lanceolatis, dimidio longioribus. Ligulae (in specim. exsicc.) aurantiacae, anguste lanceolatae, apice integrae, ad basem minute hispidae, 7-9-lineatae, 1.5-1.8 cm. longae. Paleae membranaceae, lineares, margine diaphanae, 6-8 mm. longae. Achaenia linearia, subplana, una facie valde unicostata, adscendente-ciliatae, supra adscendente-hispidae, biaristatae aristis brevibus et nudis, 8-9 mm. longa.

John Gossweiler 4176, among the ferruginous rocks near the fort at Kambango, Princip. Amelia, Africa, Dec. 1907 (type in Herb. Brit. Mus.).

Bidens cinerea, sp. nov.—Herba, annua (?), erecta aut adscendente-erecta, cinerea; caule striato, squarroso-hispido, subtetragono, monocephalico (aut ramis monocephalicis). Folia opposita, petiolata, tuberculato-scabrida et minute spinuloso-setosa, ternata aut pinnata, petiolo adjecto 2-6 cm. longa; lobis dentatis aut lobulatis, ovatis aut lanceolatis, brevioribus paulo aut etiam dimidio quam petiolis; petiolis spinuloso-setosis, 0.5-2 cm. longis. Capitula terminalia, ligulata, pedunculis 6-10 cm. longis, flosculis hermaphroditis exsertis. Involucrum hispidum, squamis duplici serie dispositis; exterioribus circa 8, linearibus, 4-5 mm. longis; interioribus dimidio longioribus, lanceolatis, margine diaphanis. Ligulae flavae, lineari-lanceolatae, apici integro, 7-9-striatae, circa 1.2 cm. longae. Paleae lineares, membranaceae, margine diaphanae, circa 8 mm. longae. Achaenia linearia, nigra, compressa, uno facie unicostato, striata, adscendente-hispida, biaristata, aristis retrorsum hamosis, circa 1.1 cm. longa.

Lieut. *C. S. Smith*, May, 1893, Kilimanjaro, Africa (type in Herb. Kew).

Bidens punctata, sp. nov.—Herba annua, erecta, gracilis, \pm 5 dm. alta, caule subtetragono, glabro (aut nodis sparsissime longo-piloso), striato, supra plus minusve sparsim ramoso; ramis subtetragonis aut teretis, tenuibus, striatis, glabris (nisi nodis pilosis); ramulis monocephalicis. Folia opposita, tripartita (infima et suprema integra), reflexa luce nigro-punctata demum, ciliata, supra sub-

glabra, infra pallidioria et sparse longo-hispida; lobis lateralibus brevibus, linearibus aut lanceolatis, integris (aut non saepe ad basim lobatis), basi saepe subangustatis; lobo terminali elongato, lineari aut lineari-lanceolato, integro (aut ad basim 1-2-dentato); petiolis plus minusve hispidis, basi connatis, 0.4-1 cm. longis. Capitula terminalia, longe (6-12 cm.) et tenuiter pedunculata, ligulata, capitula ligulata 2 cm. lata. Involucrum basi hispidum, squamis duplici serie dispositis; exterioribus (5-8) lineari-spathulatis, glabris aut hispido-ciliatis (aut etiam sparse hispidis), 2-4 mm. longis; interioribus lanceolatis, membranaceis, striatis, margine diaphanis, sparsim hispidis, 5-8 mm. longis. Ligulae flavae, lineari-lanceolatae, apice integro, 5-9-lineatae, 8-10 mm. longae. Paleae lineares, striatae, membranaceae, margine diaphanae, demum 6-7 mm. longae. Achaenia linearia, compressa, nigra, marginibus et faciebus tuberculatis aut tuberculato-hispidis, apici hispido pectinatim, biaristata, aristis 1-2 retrorsum hamosis.

Archdeacon *W. P. Johnson* 343, Tumbi (Makapula), April 27 (1901?; type in Herb. Kew); *idem* 341, Tumbi hill, Tumbi, April 27 (1901?).

The description here given is drawn mainly from the type sheet in Kew Herbarium, although certain dimensions, etc., are taken from *Johnson* 341 (also at Kew), a sheet with a larger and more matured plant. It may be remarked here that the punctate character noted above for the leaves is to be met with in *Bidens Taylori* and *B. Baumii* (see below), also a small number of other species.

Bidens vincaefolia Karsten et Schultz Bipontinus, sp. nov.—Herba, perennis (?), volubilis (?), caule angulato aut tetragono, ramoso; ramis glabris aut subglabris, tetragonis, striatis. Folia opposita, petiolata, petiolo adjecto 2-3 cm. longa, tripartita aut raro indivisa, subcoriacea aut membranacea, subtus pallidiora et ad venas minute pubescentia, marginibus integris ("rarius serrata" ex Karst. et Schz. Bip.) et in specimine sicco subrevolutis; foliolo terminale lanceolato, 1-1.8 cm. longo; foliolis lateralibus oblanceolatis aut obovatis, 0.6-1.3 cm. longis; petiolo ciliato, 1-1.8 cm. long. Capitula pedunculata, ligulata, circiter 1 cm. lata. Involucrum basi hispidum; squamis duplici serie dispositis et subaequalibus; exterioribus circiter 5, linearibus, plus minusve pubescentibus, nigro-striatis, 3-4 mm. longis; interioribus

lanceolatis, subglabris. Ligulae circiter 6 aut 7, flavae, nigro-striatae nonnullis lineis, 5-8 mm. longae. Paleae lineares, striatae, marginibus diaphanis. Achaenia linearia, biaristata aristis retrorsum hamosis, circiter 1 cm. longa.

Karsten, Bogota, Columbia (type in Herb. Mus. Hist. Nat. Paris).

This species appears very unique, being distinct in general aspect from any other species known to me. The type sheet, originally in SCHULTZ BIPONTINUS' own herbarium, bears several small specimens. These are remarkably uniform and are allied most nearly with *Bidens rubifolia* H. B. K., the leaves of which are much less diminutive. The label bearing the specific name here set forth has also the date Dec. 18, 1856, which, from its position on the label, may be that of the determination rather than the collection. While true *Bidens rubifolia* grows at Bogota (e.g., *I. F. Holton* 365, Oct. 28, 1852), KARSTEN and SCHULTZ BIPONTINUS evidently regarded the Karsten plant specifically distinct. This course I also must adopt, as I am unable to connect the two forms in herbaria by any intermediate forms.

BIDENS ODORATA Cav. Icon. et Descript. Plant 1:9. pl. 13. 1791; *Coreopsis ferulaefolia* Jacq. var. *odoratissima* Pers. Synops. Plant. 2:477. 1807; *Bidens ferulaefolia* DC. var. *odoratissima* DC. Prodr. 5:603. 1836.—For many years, PERSOON'S variety *odoratissima* of *Coreopsis ferulaefolia* seems to have been unfamiliar to botanists. DECANDOLLE (*l. c.*) merely mentioned it: "quid sit var. *odoratissima* à Persoonio citata ignoro." PERSOON'S variety was founded on CAVANILLES' plant in JUSSIEU'S herbarium and was said to be native to Peru. This cited specimen I have not found, but there exists in the British Museum a good specimen from CAVANILLES, labeled "*Coreop[s]is odoratissima* nobis, Mexico," which matches PERSOON'S description precisely. The leaves, probably because of having grown under cultivation, are especially slender-divided and give a superficial resemblance to those of *Bidens ferulaefolia* (Jacq.) DC. The specimen is identical with two other specimens (in Herb. Brit. Mus.) from the herbarium of CAVANILLES, one labeled "*Coreopsis odorata* olim *Bidens*," and the other "*Bidens odorata* Cav. Ic. V. 1, nunc *Coreopsis*." Both of these last two are further labeled, in pencil, "*Cosmos odoratus*."

A study of other mature specimens of *Bidens odorata* shows that it is a Mexican species primarily (if not indeed exclusively), and is not at all a *Coreopsis*, but rather a true *Bidens*, although

having achenes sometimes approaching those of *Cosmos* and with rays varying, in herbarium specimens, from yellow to white, rose, or violet (a single sheet frequently showing all these variations, as, for example, *Palmer* 674, Herb. Kew).

During the past few years, certain writers, notably OLIVER and HIERN, S. L. MOORE, and O. HOFFMANN, have described a considerable number of striking and positively new species of *Coreopsis* and *Bidens* from various parts of Africa. In their generic distinctions, however, they have unfortunately been guided mainly by the direction of the barbs on the awns of the achenes, or, in certain cases, they have had access at the time to immature achenes only. Regarding the latter point, the disadvantage and source of error are at once evident on examining the real distinctions between *Coreopsis* and *Bidens*. As will be seen below, the presence of two more or less conspicuous lateral wings upon the achenes seems by far the most nearly constant character of *Coreopsis* as distinguished from *Bidens*. But in several species of *Coreopsis* these wings are completely lacking on the immature achenes. Thus, species described from immature specimens as *Bidens* may later prove to be *Coreopsis*. Again, a species erroneously described from immature specimens as *Coreopsis*, because of a recognized resemblance to some particular species of *Coreopsis* and disregarding the absence of wings, must thereafter be treated by botanists as *Coreopsis* until mature material can be obtained to prove its status as true *Bidens*.

Concerning the direction of the barbs on the awns of the achenes, however, a more detailed statement is needed. Until comparatively recent times, botanists referred to *Bidens* those species with retrorsely barbed awns, and to *Coreopsis* those species with antrorsely barbed awns or with awns inconspicuous. But, from time to time in North America, new forms have been discovered, identical in each case with a certain species of *Coreopsis* (as then delimited) or *Bidens* except in the direction of the barbs on the awns. ASA GRAY (cf. FERNALD, *Rhodora* 15:77. 1913), when confronted with such a form of "*Coreopsis aristosa* Michx." (the then accepted name), designated it "*C. aristosa* in Bidentem transformata." Later (*Synop. Fl. N. Amer.* 1^{II}:294-296. 1884) he treated this

and similar forms as hybrids between *Coreopsis* and *Bidens*. Still later, BRITTON (Bull. Torr. Bot. Club 20:280-281. 1893), emphasizing the instability of the barb-direction character for *Bidens frondosa* L., and also separating the two genera on general grounds rather than by one particular character, transferred six species from *Coreopsis* to *Bidens*. The validity of these transfers has since been accepted unhesitatingly by all prominent American botanists who have critically studied the Eastern United States species of *Bidens*, among them WIEGAND (Bull. Torr. Bot. Club 26:401. 1899), GREENE (e.g., Leaflet Bot. Crit. 1:200.² 1906), and ROBINSON and FERNALD (GRAY'S Man. ed. 7. p. 839. 1908). It is also implied by many other American botanists working upon the species of other regions but following the same distinctions, a singular case being that of BRANDEGEE'S description (Zoe 5:239. 1908) of *Bidens alpina* and GREENMAN'S description (Proc. Amer. Acad. 41:264. 1905) of *Bidens sarmentosa*. The achenes are described for *B. alpina* as "nearly smooth; awns none or two varying from 1 mm. long to rudiments, corneous and not barbelate"; for *B. sarmentosa*, as "glabrous or sparingly hispidulous, awnless or with reduced awns." But, on investigation, these species are found to be identical; in turn, *B. sarmentosa*, which from priority of publication would otherwise stand as the accepted species, is found to match³ in every character *Coreopsis anthemoides* DC., having achenes described (DC. Prodr. 5:573. 1836) as "(immaturis) linearibus glabris brevissime bidentatis." Thus, a species placed by DECANDOLLE in *Coreopsis*, evidently because of its very short awns, was independently referred by BRANDEGEE and by GREENMAN, about 70 years later, to *Bidens*, evidently

² Thus, GREENE refers to *Bidens* a plant ("*B. tenuissima*") with "erect, upwardly barbed awns."

³ I have examined several authentic cotypes of *B. alpina*, the type and numerous authentic cotypes of *B. sarmentosa*, also several cotypes of "*Coreopsis anthemoides*" (*Bidens anthemoides* Sherff, Bot. Gaz. 56:493. 1913). War conditions in Europe have precluded for the present my examination of DECANDOLLE'S type at Geneva. However, the characters cited by DECANDOLLE and his comparison of this species with *Anthemis arvensis*, which it at times simulates in habit to a remarkable degree, leave no doubt that the cotypes examined (in Herb. Brit. Mus. and elsewhere) truthfully represent the type.

because the achenes lack wings and the general characters coincide closely with those of certain unquestioned species of *Bidens* (e.g., *B. humilis* H. B. K., with awns retrorsely barbed).

FERNALD, in a recent discussion of the awn characters of *Bidens* (*Rhodora* 15:74-78. 1913), lists no less than six American species in which occurs a more or less pronounced form having the awns barbed in the reverse from the normal direction. Thus, for example, *Bidens connata* Muhl. has awns retrorsely barbed, while var. *anomala* Farwell has awns antrorsely barbed. Again, *Bidens aristosa* (Michx.) Britton has antrorsely barbed awns, while the probably valid var. *Fritcheyi* Fernald has retrorsely barbed awns. Hence it is obvious that, were the old artificial method of distinguishing between *Coreopsis* and *Bidens* (namely by the direction of the barbs on the awns) to be retained, an anomalous situation would result. We should be compelled either to regard each of these varieties as a hybrid between two species of distinct genera, a course certainly unwarranted in several cases (cf. FERNALD, *l. c.*, and WIEGAND, *Bull. Torr. Bot. Club* 26:401. 1899), or to refer each variety to the other genus, an entirely indefensible alternative. We are compelled, then, to view these varieties, in at least the majority of cases, as merely more or less distinct and pronounced forms of their respective species. This being true, the awn character method of separating *Coreopsis* from *Bidens* proves utterly worthless, and must be permanently abandoned, as it indeed has been by American botanists.

On reference to recent descriptions and types of African species of *Bidens*, we find that in several cases the awns, even on achenes on the same head, are barbed both antrorsely and retrorsely. Thus, for example, MOORE (*Jour. Linn. Soc. Bot.* 37:322. 1906) created the name *Bidens ambigua* for *Gossweiler* 1189, precisely for the reason that some of the awns are smooth, others antrorsely barbed, and others retrorsely barbed ("achaeniis . . . aristis 2 quam se ipsa brevioribus dentibus perpaucis nunc erectis nunc recurvis onustis vel etiam omnino calvis . . . , hence the trivial name"). Yet in the same year (*Jour. Bot.* 44:22. 1906) he likewise somewhat arbitrarily created the name *Coreopsis Taylori* for a plant showing the same variation (coll. *W. E. Taylor*, Jan. 5, 1886;

“achaeniis . . . apice setuloso-ciliatis calvis vel aristulis 1 vel 2 brevissimis erecto—vel patenti—vel etiam recurvo—uncinulatis onustis saepe vero nudis . . . ; indeed, the plant might almost as well be considered a *Bidens*, but the habit is that of *Coreopsis*”). In referring the latter species to *Coreopsis*, he relied mainly upon its habital similarity to other (so-called) species of *Coreopsis* from Africa. But, as will be seen presently, some of these species belong in reality to *Bidens*. Therefore, this habital similarity, affording formerly an apparently good reason for the name *Coreopsis Taylori*, can no longer be given much consideration.

The present writer, in bringing together the numerous species of *Bidens* for monographic treatment, has come to adopt fully the generic limits of these two genera as followed by recent American botanists. In brief, the genus *Coreopsis* is maintained primarily because of the peculiar habit and winged achenes of the Linnaean type species (excluding *C. alba*, *C. Bidens*, and *C. alternifolia*, Sp. Plant ed. 1. pp. 907–909. 1753; cf. BRITTON, Bull. Torr. Bot. Club 20:280. 1893). Similarly, the genus *Bidens* is maintained primarily because of the peculiar habit, strongly barbed awns, and wingless achenes of several of the Linnaean type species of *Bidens*. Among the species of either small group a fair degree of uniformity in several characters occurs. But on extending our observations to other species of *Coreopsis* and *Bidens*, we find remaining no absolute uniformity in even one distinctive character. However, one such character does persist to a surprising extent. It is the presence (in *Coreopsis*) or absence (in *Bidens*) of two lateral wings upon the mature achene. Among so many species from widely remote regions does this character separate two genera with different aspects that, *in cases where other criteria are absent*, it appears to offer the only logical basis of distinction. Accordingly, and with a view to thus delimiting these two genera more accurately, notably among the African species (where the generic limits tend to overlap) this basis of distinction is here adopted. As a consequence, it is found necessary to make the following transfers for the flora of Africa. This list includes only those species upon the types or other positively authentic material of which I have personally examined the mature achenes.

Bidens arenicola (S. Moore), comb. nov.—*Coreopsis arenicola* S. Moore, Jour. Linn. Soc. 37:170. 1905.

Bidens Grantii (Oliver), comb. nov.—*Coreopsis Grantii* Oliver, Trans. Linn. Soc. 29:98. pl. 65. 1873.

Bidens grandis, nom. nov.—*Coreopsis speciosa* Hiern, Cat. Welw. Afr. Pl. 3:585. 1898.

Bidens Kirkii (Oliver and Hiern), comb. nov.—*Coreopsis Kirkii* Oliver and Hiern, Fl. Afr. Trop. 3:390. 1877.

The type material (in Herb. Kew) lacks mature achenes, but the mature material of *G. F. Scott Elliot* 6909, referable to this species, has the achenes of a true *Bidens*.

Bidens ambacensis (Hiern), comb. nov.—*Coreopsis ambacensis* Hiern, Cat. Welw. Afr. Pl. 3:586. 1898.

Bidens ugandensis (S. Moore), comb. nov.—*Coreopsis ugandensis* S. Moore, Jour. Linn. Soc. 35:347. 1902.

Bidens ruwenzoriensis (S. Moore), comb. nov.—*Coreopsis ruwenzoriensis* S. Moore, Jour. Linn. Soc. 35:345. 1902.

Bidens kilimandscharica (O. Hoffm.), comb. nov.—*Coreopsis kilimandscharica* O. Hoffm., Bot. Jahrb. 20:234. 1894.

Bidens Schweinfurthii, nom. nov.—*Coreopsis linearifolia* Oliver and Hiern, Fl. Afr. Trop. 3:390. 1877.

This species is here given a new name to avoid any possible confusion with *Bidens linearifolia* Schz. Bip., which, in fact, is a true *Cosmos* and has been renamed correctly *C. linearifolius* Hemsley (Biol. Centr. Amer. 2:200. 1881).

Bidens Taylori (S. Moore), comb. nov.—*Coreopsis Taylori* S. Moore, Jour. Bot. 44:22. 1906.

Bidens insecta (S. Moore), comb. nov.—*Coreopsis insecta* S. Moore, Jour. Bot. 46:42. 1908.

Bidens Baumii (O. Hoffm.), comb. nov.—*Coreopsis Baumii* O. Hoffm. in H. Baum Kun.-Sambes. Exped. 419. 1903.

Bidens Elliotii (S. Moore), comb. nov.—*Coreopsis Elliotii* S. Moore, Jour. Linn. Soc. 35:346. 1902.

BIDENS FLORIBUNDA H. B. K., Nov. Gen. 4:238. 1820; *Bidens simplicifolia* Wright, Kew Bull. 1906:5. 1906.—The type of *B. simplicifolia* Wright (in Herb. Kew) is identical with the type

specimen of *B. floribunda* H. B. K. (in Herb. Mus. Hist. Nat. Paris).⁴ An important feature of *B. floribunda* is its simple leaves, although KUNTH, in the original description, betrayed doubt as to whether tripartite leaves are completely lacking (foliis . . . simplicibus, nisi folia inferiora, a me haud visa, in hac quoque specie ternata sint"). WRIGHT, in describing *B. simplicifolia* ("a specibus reliquis Austro-Americanis foliis indivisis ovatis acuminatis differt"), was clearly unaware that this same species had already long before been described from the same country (Ecuador) as *B. floribunda*. An excellent cotype of *B. simplicifolia* in the Herbarium of Field Museum has foliage much superior to that of the type. It possesses four pairs of large simple leaves, the lowermost ones 15.2 cm. long and 5.6 cm. wide. From these it would appear even more plausible that the species is constantly simple leaved.

BIDENS ALAUSENSIS H. B. K., Nov. Gen. 4:184. 1820; *Bidens valparadisiaca* Colla, Mem. Accad. Torin. 38:12. pl. 24. 1835; *Bidens chilensis* DC., Prodr. 5:603. 1836.—A study of several authentic specimens of *B. chilensis* DC. collected around Quillota, Chile, by BERTERO about 1829, shows that these are precisely the same as the type specimen (fig. 1) and BONPLAND'S private duplicate specimen of *B. alausensis* H. B. K. (both specimens in Herb. Mus. Hist. Nat. Paris). Other specimens, collected at various dates by GAY, W. H. HARVEY, BRIDGES, etc., and all determined as *B. chilensis*, show that the rays are frequently white, as stated by BERTERO (DC., *l. c.*), instead of yellow, as in DECANDOLLE'S type specimen.

Regarding *B. valparadisiaca* Colla we need only to say that it was founded upon BERTERO'S material, as was DECANDOLLE'S *B.*

⁴ The only difference that I can detect is that, in at least its cotype material examined, *B. simplicifolia* has the exterior involucre bracts mainly subspatulate and only slightly ciliate; in the type of *B. floribunda*, these are more oblong and more ciliate. While such a variation in shape or size of these bracts has already, in some species, been made the basis for a varietal distinction (e.g., *B. rosea aequisquama* Fernald, Proc. Amer. Acad. 43:68. 1907), such a course would seem undesirable here. Aside from the fact that these bract characters frequently vary, in other better known species of *Bidens*, from oblong to spatulate on the same head, it would mean the unwelcome use, according to rules, of the name *simplicifolia* for a variety of a species that itself is simple leaved (*simplicifolia*).

chilensis,⁵ and hence likewise must be synonymized with *B. alausensis*.

It is interesting to note that *Bidens crithmifolia* H. B. K. was suspected by SPRENGEL (Syst. Veg. ed. 16^{III}. p. 454. 1826) of belonging to *B. alausensis*. A study of the types of both species shows, however, that they are entirely distinct.

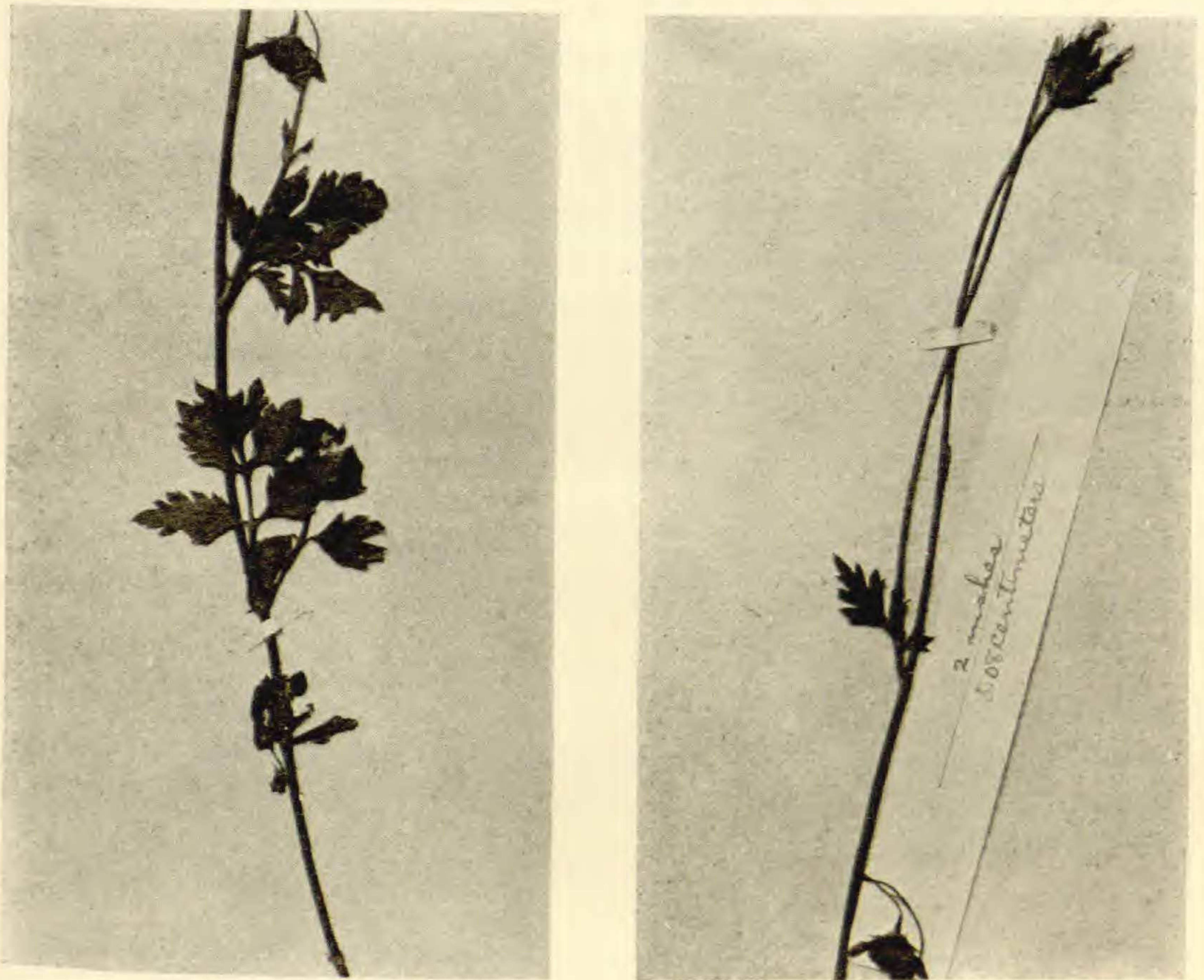


FIG. 1.—Type of *Bidens alausensis* H. B. K. in Herb. Mus. Hist. Nat. Paris; the two photographs slightly overlap.

BIDENS TENELLA L., Amoen. Acad. 6:96. 1763.—This species, was included by DECANDOLLE (Prodr. 5:605. 1836) among the “species non satis notae.” A sheet with two specimens exists however, in the Linnaean Herbarium. These are in good condition and show at once that the species is in no way a *Bidens*, and

⁵ *B. valparadisiaca* was based (COLLA, *l. c.*) upon a specimen from Valparaiso, while *B. chilensis*, which DECANDOLLE himself equated with it, was based upon a specimen collected in the immediate vicinity, but to the northeast (“circa Quillota,” DC., *l. c.*).

may even be founded upon two distinct plants from widely separate parts of the world. In fact, the sheet bears a 'determination by SCHULTZ BIPONTINUS, naming the plant "ad sinistram *Pectis (tenella)*" and that "ad dextram *Charieis heterophylla* Cass."

BIDENS ANDONGENSIS Hiern, Cat. Welw. Afr. Pl. I^{III}: 588. 1898.—At the time of describing this species, HIERN confessed himself uncertain as to its generic status, owing to the insufficient material. Since then, however, an admirable, well developed specimen (*John Gossweiler* 3631, Angola, August 3, 1907) has been received at the Herbarium of the British Museum. This matches sufficiently in each detail the plant fragment and drawings on the type sheet, at the same herbarium, and proves conclusively that the species is a true *Bidens*.

✓ *Bidens elata*, comb. nov.—*Bidens cernua* L. var. *elata* Torr. and Gr., Fl. N. Amer. 2: 352. 1842; *Bidens dentata* Wieg., Bull. Torr. Bot. Club 26: 412. 1899, non *Bidens quadriaristata* DC. var. *dentata* Nutt.; *Bidens amplissima* E. L. Greene, Pittonia 4: 268. 1901.—An excellent specimen of this species, collected by SCOULER at the Straits of De Fuca, is in the Torrey Herbarium, now included in the Herbarium of the N.Y. Bot. Garden. It is identical with the Scouler specimen of HOOKER'S herbarium (now in Kew Herb.), a specimen referred by HOOKER (Hook. Fl. Bor. Amer. 1: 314. 1833) to *B. chrysanthemoides* Michx. (but entirely distinct from Michaux's two type specimens in Herb. Mus. Hist. Nat. Paris). It is identical also with the type and cotype specimens of *B. amplissima* Greene. However, it is very different from the type (fig. 2) of *B. quadriaristata* DC. var. *dentata* Nutt. (in Herb. Brit. Mus.), a plant cited synonymously by TORREY and GRAY, but probably never seen by them, as indeed their failure to use their customary exclamation marks would partly imply.

WIEGAND, following TORREY and GRAY'S treatment, likewise equated these two plants, but GREENE (*l. c.*), who, however, had not seen NUTTALL'S type, justly denied their identity. Still GREENE'S name *B. amplissima* is superfluous according to rule of nomenclature, and the name *elata*, supported by a description ("leaves . . . unequally and incisely serrate," etc., Torr. and

Gr., *l. c.*) that very definitely characterizes the cited specimens,⁶ must be used for this species.

Bidens aurea, comb. nov.—*Coreopsis aurea* Ait., Hort. Kew. 3: 252. 1789; *Bidens coronata* auct., non L.—In a former article

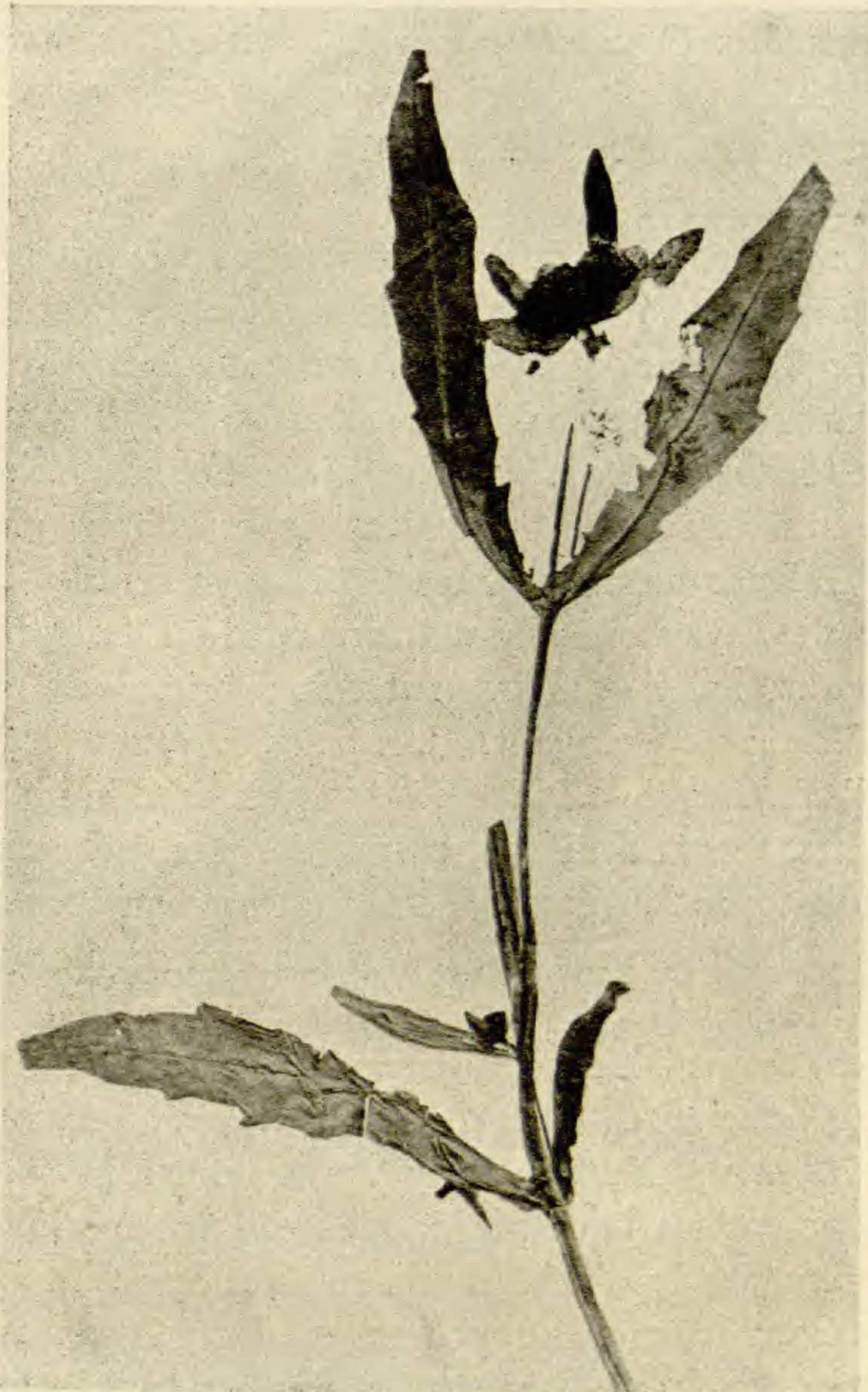


FIG. 2.—Type of *Bidens quadriaristata* DC. var. *dentata* Nutt., in Herb. Brit. Mus.

(BOT. GAZ. 56:495. 1913), it was stated that BRITTON and not FISCHER was the one to transfer *Coreopsis coronata* L. to *Bidens*. An inspection, furthermore, of BRITTON'S article cited (Bull. Torr.

⁶ At least the Scouler specimens. I have not seen the Douglas specimens.

Bot. Club 20:280. 1893) shows that he was merely treating a group of *Coreopsis* species of GRAY'S *Synoptical flora* en masse, and was concerned with their generic rather than specific status. And study of GRAY'S descriptions and notes (GRAY, Synop. Fl. N. Amer. 1^{II}:294. 1884) shows that GRAY equated, though somewhat provisionally, *Coreopsis aurea* Ait. with *C. coronata* of the Linnean Herbarium, a view retained as well by BRITTON (BRITTON and BROWN, Illustr. Fl. 3:498. 1913).

My search through the material of *Bidens* and nearly allied genera at Kew Herbarium failed to reveal an original specimen of *Coreopsis aurea* Ait., but a good and authentic sheet from Kew Gardens, in 1785, occurs in the Herbarium of the British Museum. It is the form recently treated by authors as *Bidens coronata* (e.g., BRITTON and BROWN, *l. c.*). In the Linnaean Herbarium, moreover, there still exists the original superb specimen of *Coreopsis coronata* L. It lacks mature achenes, but its several beautiful 8-rayed heads, with the rays strikingly well arranged on the paper (fig. 3), leave no doubt that LINNAEUS had this specimen at hand when describing *C. coronata* (Sp. Plant. ed. 2. 2:1281. 1763; "radio magno, octopetalo," etc.). While, indeed, LINNAEUS cited in his synonymy plants of VAILLANT and of PLUMMIER, these have been justly excluded by subsequent authors. Thus, for forming a true conception of *C. coronata* L., there are left for us the Linnaean specimen and description. The latter, by itself, is inadequate. The former, in GRAY'S time, seemed likewise disappointing, as being too nearly intermediate between *C. aurea* Ait. and *C. trichosperma* Michx. of his *Synoptical flora*. But, in later years, numerous specimens of these last two species have been added to our American herbaria and show very clearly differences in leaf outlines that GRAY, with his scantier material, could not properly define. A comparison with these specimens shows at once that the Linnaean type is the *Coreopsis trichosperma* Gray (*l. c.*), and hence *Bidens trichosperma* Britton.⁷

⁷ Since the foregoing lines were written, Dr. N. L. BRITTON has kindly written me that many years ago he examined the Linnaean type, but, while entertaining doubts as to its true status, felt constrained, for want of achenes, to follow GRAY'S treatment, except as to generic affiliations. However, Dr. M. L. FERNALD has just informed me that GRAY'S fragment at Gray Herbarium, from the Linnaean Herbarium (where certain heads are missing on the single type specimen), "shows perfectly characteristic fruit of *B. trichosperma*, not of *B. coronata* of recent authors," thus confirming my conclusions in a most emphatic way.

My inability to find MICHAUX's specimen of his *Coreopsis trichosperma* in the Michaux collection at Paris (in Herb. Mus. Nat.



FIG. 3.—Type of *Bidens coronata* (L.) Britton in Herb. Linn.

Hist. Paris) makes it impossible to state definitely whether MICHAUX's specimen was *Bidens aurea* (Ait.), as here introduced, or

B. coronata (L.) Britton. Fortunately, lack of priority in either case precludes the use of MICHAUX'S name *trichosperma*, and we thus are able to use names—*B. aurea* (Ait.) and *B. coronata* (L.) Britton—that are supported with authentic type or cotype specimens still extant and in a good state of preservation.

The plant with leaves divided into linear segments (*Diodonta leptophylla* Nutt., Trans. Amer. Phil. Soc. II. 7:360. 1841; *Bidens coronata* var. *leptophylla* Mohr, Contrib. U.S. Nat. Herb. 6:808. 1901) must properly be designated *Bidens aurea* (Ait.), var. **leptophylla** (Nutt.), comb. nov. NUTTALL'S original specimen is still preserved in excellent condition (in Herb. Brit. Mus.).

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